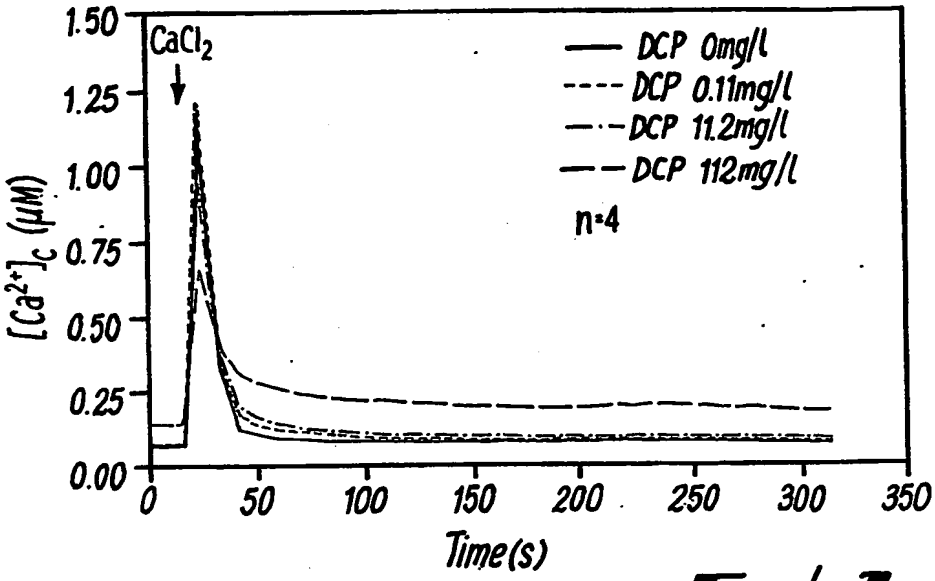
1.50
1.25
1.00
0.75
0.50
0.25
0.00
$[Ca^{2+}]_c$ (μM)
$CaCl_2$
DCP 0mg/l
DCP 0.11mg/l
DCP 11.2mg/l
DCP 112mg/l
n=4
0
50
100
150
200
250
300
350
Time(s)

FIG. 1

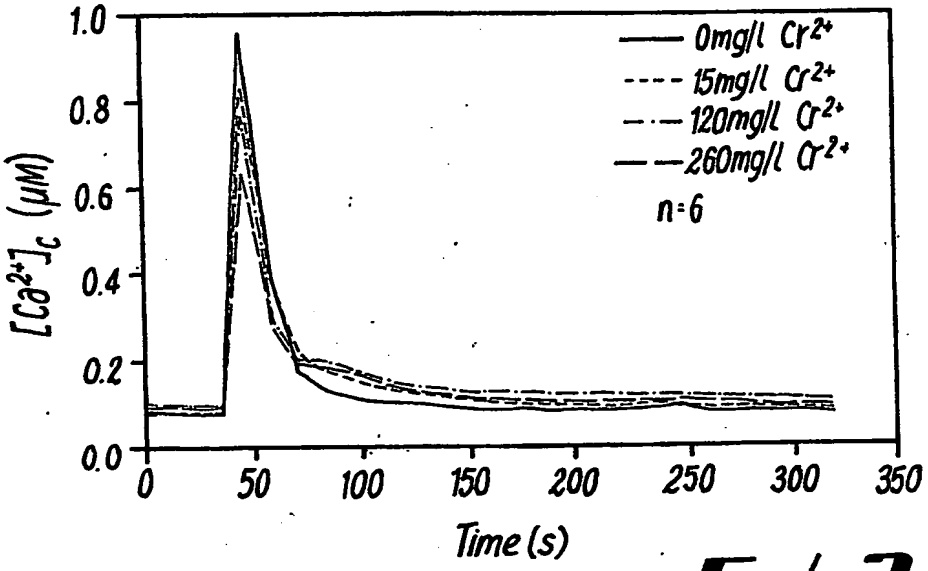
1.0
0.8
0.6
0.4
0.2
0.0
$[Ca^{2+}]_c$ (μM)
0mg/l $Cr^{2+}$
15mg/l $Cr^{2+}$
120mg/l $Cr^{2+}$
260mg/l $Cr^{2+}$
n=6
0
50
100
150
200
250
300
350
Time (s)

FIG. 2

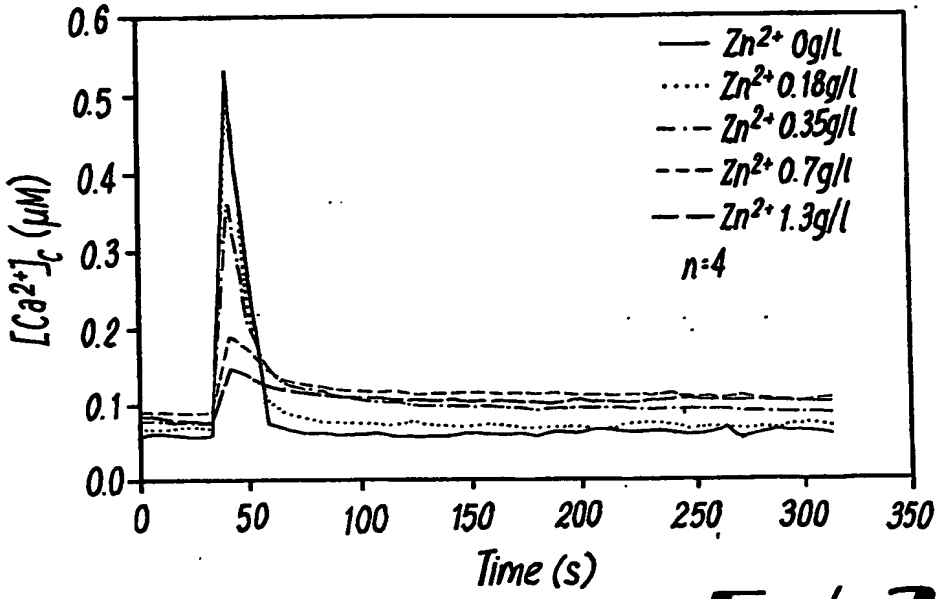
0.6
0.5
0.4
0.3
0.2
0.1
0.0
$[Ca^{2+}]_c$ (μM)
0
50
100
150
200
250
300
350
Time (s)
$Zn^{2+}$ 0g/l
$Zn^{2+}$ 0.18g/l
$Zn^{2+}$ 0.35g/l
$Zn^{2+}$ 0.7g/l
$Zn^{2+}$ 1.3g/l
n=4

FIG. 3

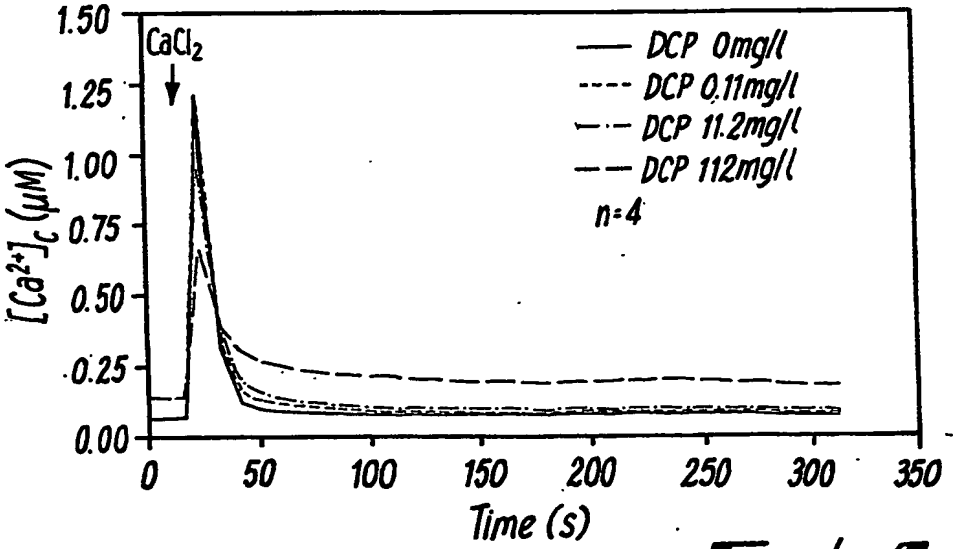
1.50
1.25
1.00
0.75
0.50
0.25
0.00
$[Ca^{2+}]_c$ (μM)
$CaCl_2$
0
50
100
150
200
250
300
350
Time (s)
DCP 0mg/l
DCP 0.11mg/l
DCP 11.2mg/l
DCP 112mg/l
n=4

FIG. 4

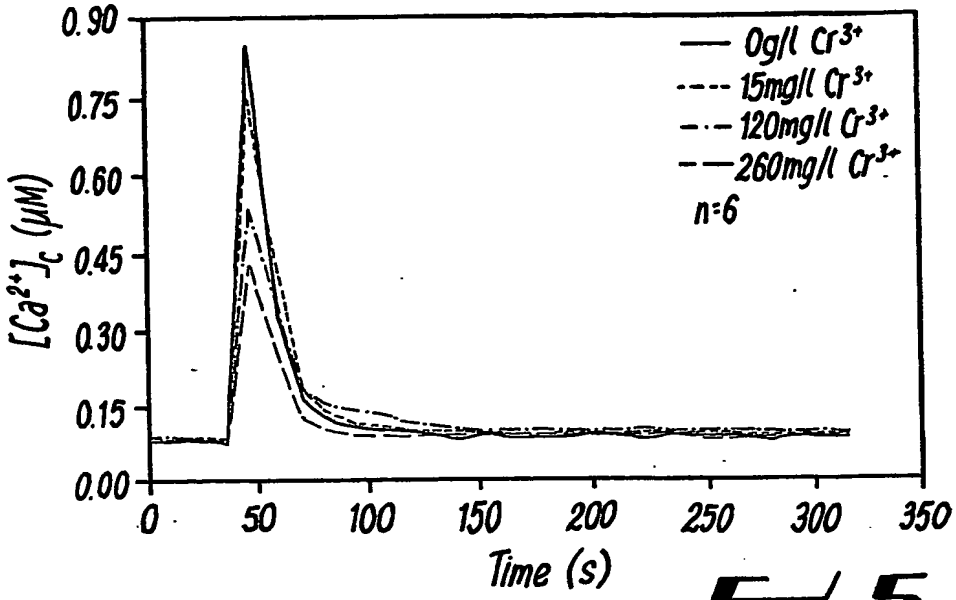
0.90
0.75
0.60
0.45
0.30
0.15
0.00
$[Ca^{2+}]_c$ (μM)
0
50
100
150
200
250
300
350
Time (s)
0g/l $Cr^{3+}$
15mg/l $Cr^{3+}$
120mg/l $Cr^{3+}$
260mg/l $Cr^{3+}$
n=6

FIG. 5

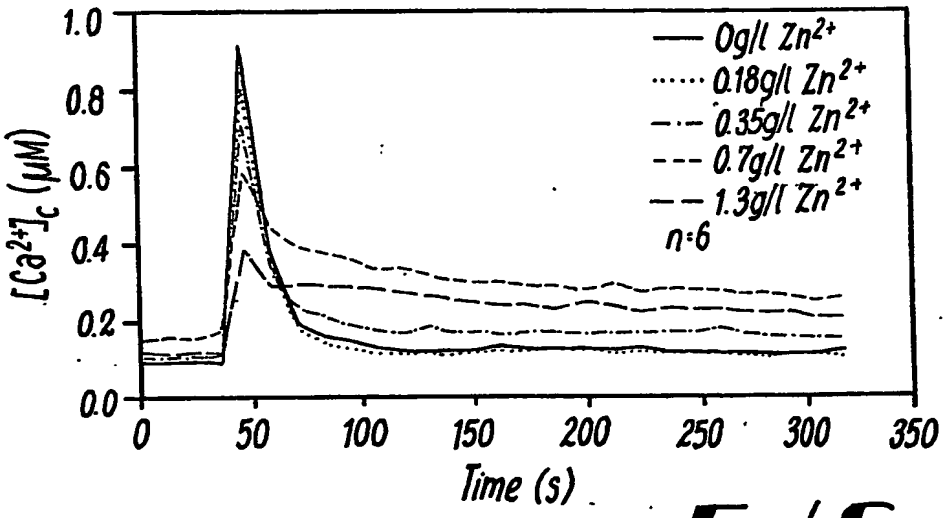
1.0
0.8
0.6
0.4
0.2
0.0
$[Ca^{2+}]_c$ (μM)
0
50
100
150
200
250
300
350
Time (s)
0g/l $Zn^{2+}$
0.18g/l $Zn^{2+}$
0.35g/l $Zn^{2+}$
0.7g/l $Zn^{2+}$
1.3g/l $Zn^{2+}$
n=6

FIG. 6

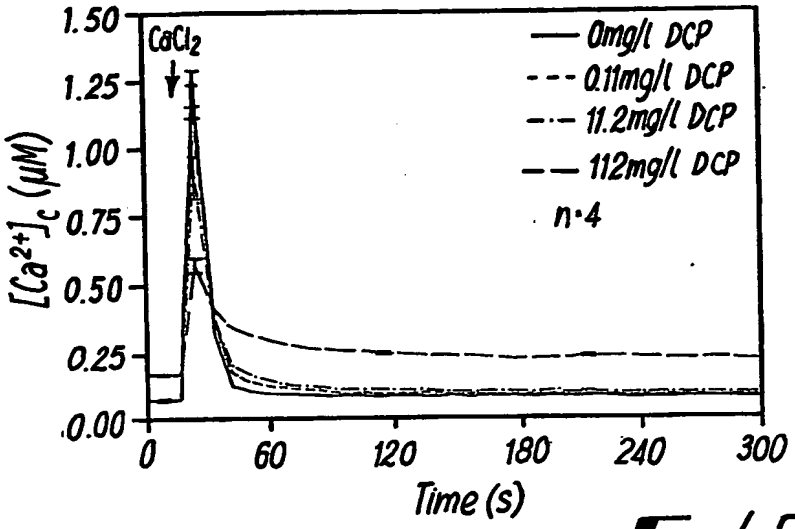
1.50
1.25
1.00
0.75
0.50
0.25
0.00
$[Ca^{2+}]_c$ (μM)
$CaCl_2$
0mg/l DCP
0.11mg/l DCP
11.2mg/l DCP
112mg/l DCP
n·4
0
60
120
180
240
300
Time (s)

FIG. 7

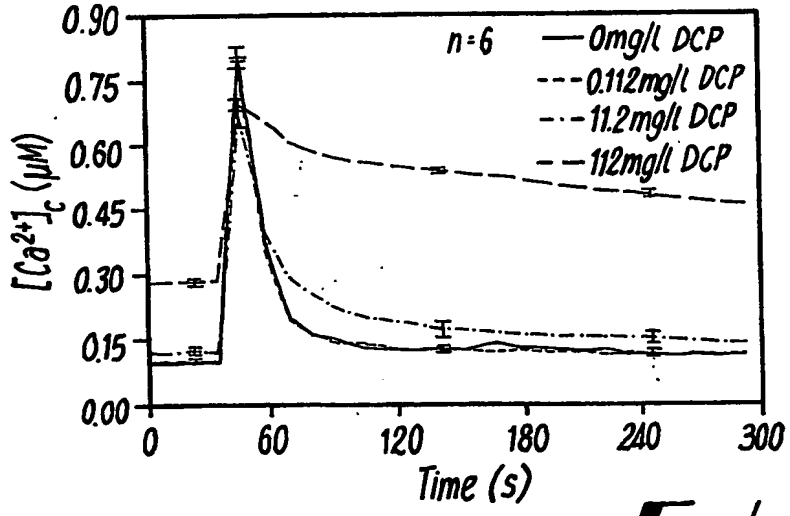
0.90
0.75
0.60
0.45
0.30
0.15
0.00
$[Ca^{2+}]_c$ (μM)
n=6
0mg/l DCP
0.112mg/l DCP
11.2mg/l DCP
112mg/l DCP
0
60
120
180
240
300
Time (s)

FIG. 8

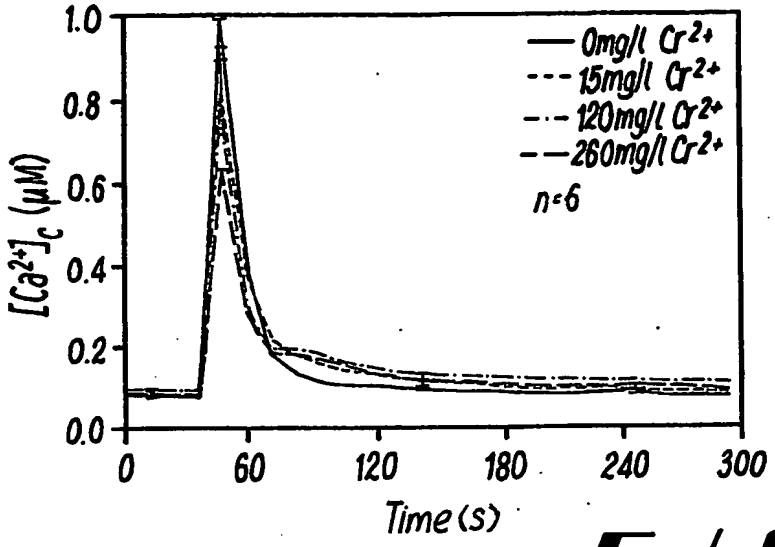
1.0
0.8
0.6
0.4
0.2
0.0
$[Ca^{2+}]_c$ (μM)
0
60
120
180
240
300
Time (s)
0mg/l $Cr^{2+}$
15mg/l $Cr^{2+}$
120mg/l $Cr^{2+}$
260mg/l $Cr^{2+}$
n=6

Fig. 9

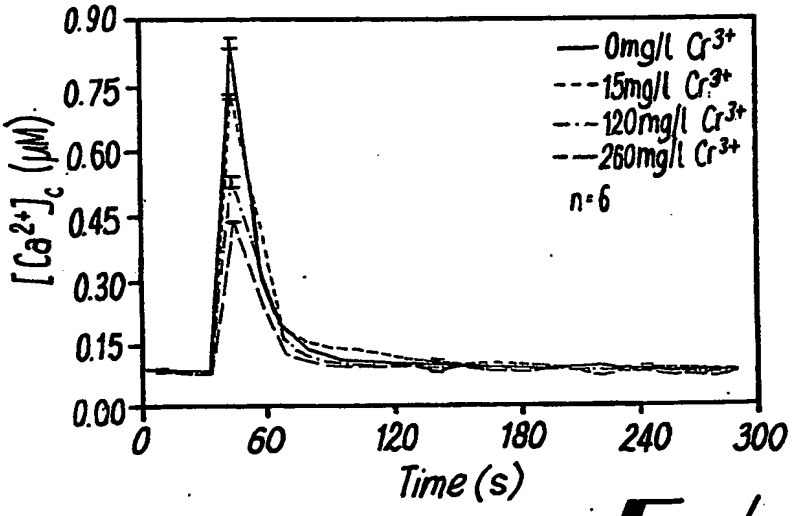
0.90
0.75
0.60
0.45
0.30
0.15
0.00
$[Ca^{2+}]_c$ (μM)
0
60
120
180
240
300
Time (s)
0mg/l $Cr^{3+}$
15mg/l $Cr^{3+}$
120mg/l $Cr^{3+}$
260mg/l $Cr^{3+}$
n=6

Fig. 10

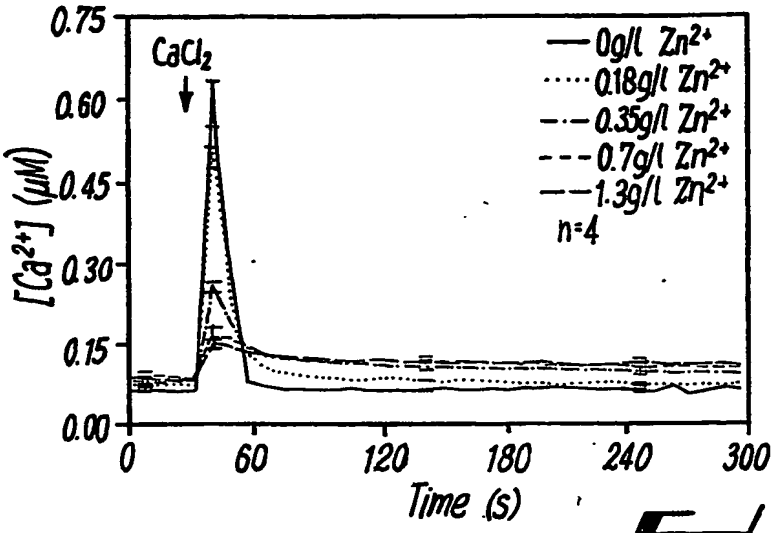
0.75
0.60
0.45
0.30
0.15
0.00
$[Ca^{2+}]$ (μM)
$CaCl_2$
0g/l $Zn^{2+}$
0.18g/l $Zn^{2+}$
0.35g/l $Zn^{2+}$
0.7g/l $Zn^{2+}$
1.3g/l $Zn^{2+}$
n=4
0
60
120
180
240
300
Time (s)

FIG. 11

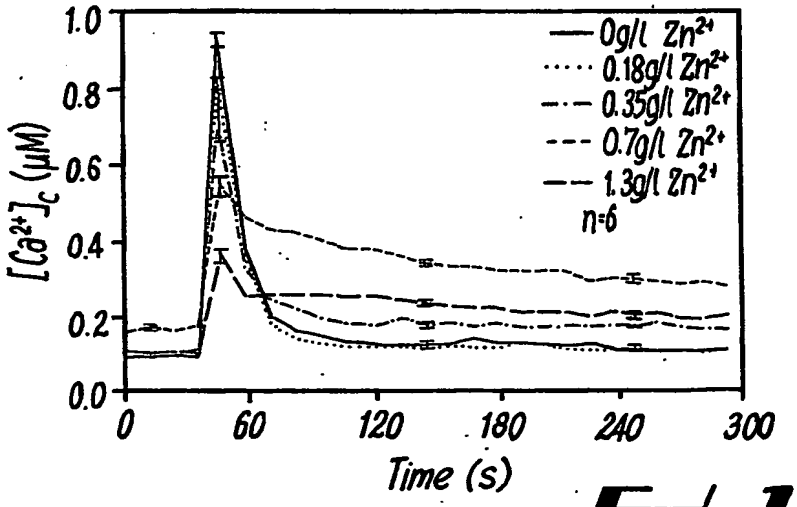
1.0
0.8
0.6
0.4
0.2
0.0
$[Ca^{2+}]_c$ (μM)
0g/l $Zn^{2+}$
0.18g/l $Zn^{2+}$
0.35g/l $Zn^{2+}$
0.7g/l $Zn^{2+}$
1.3g/l $Zn^{2+}$
n=6
0
60
120
180
240
300
Time (s)

FIG. 12

| Chemical | Values of interest (mg/l) | LT | | RT | | A | | $LT_{50}$ | | %IpreSRL | %IFRL | | %IRT | | Number of increases | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | S1 | S2 | S1 | S2 | S1 | S2 | S1 | S2 | S2 | S1 | S2 | S1 | S2 | S1 | S2 |
| | 0.01 | 0 | 0 | 1 | 1 | 75±23 | 100±5 | ↑ | - | 97±9 | 115±6 | 104±6 | 111±4 | 102±3 | 1 | 1 |
| | 0.1 | 0 | 0 | 1 | 1 | 74±22 | 91±5 | ↑ | - | 104±9 | 118±5 | 104±11 | 122±9 | 99±3 | 1 | 1 |
| PCP | 1 | 0 | 0 | 1 | 1 | 72±14 | 80±10 | ↑ | - | 109±5 | 204±13 | 107±11 | 195±8 | 109±6 | 1 | 1 |
| | 5 | 0 | 0 | 12.6 | 1 | 199±26 | 89±14 | ↑ | ↑ | 120±3 | 209±7 | 205±9 | 274±4 | 218±7 | 1 | 1 |
| | 10 | 0 | 0 | 12.6 | 12.6 | 417±73 | 175±27 | ↑ | ↑ | 131±9 | 305±17 | 253±7 | 373±22 | 308±4 | 1 | 1 |
| | 1 | 0 | 0 | 1 | 1 | 111±48 | 102±8 | - | - | 125±34 | 116±5 | 106±7 | 114±6 | 109±9 | 1 | 1 |
| | 10 | 0 | 0 | 12.6 | 1 | 246±19 | 118±4 | ↑ | ↑ | 136±13 | 162±7 | 120±13 | 243±14 | 154±10 | 1 | 1 |
| SDS | 50 | 0 | 0 | 12.6 | 1 | 295±33 | 115±12 | ↑ | ↑ | 323±19 | 237±9 | 222±16 | 328±6 | 287±10 | 1 | 1 |
| | 100 | 0 | 0 | 12.6 | 1 | 293±19 | 116±3 | ↑ | ↑ | 359±24 | 405±15 | 256±14 | 367±11 | 286±12 | 1 | 1 |
| | 500 | 0 | n.a. | 12.6 | n.a. | 998±35 | n.a. | ↑ | n.a. | n.a. | 561±12 | n.a. | 565±12 | n.a. | 1 | n.a. |
| Toluene | 1 | n.a. | 0 | n.a. | 1 | n.a. | 74±13 | n.a. | - | 129±9 | n.a. | 113±3 | n.a. | 115±2 | n.a. | 1 |

Note: LT=lag time
RT=rise time
A=changes in A (%)

%IpreSRL=% increase in pre-stimulation resting level
%IFRL=% increase in final resting level
%IRT=% increase in recovery time
S1=Stage 1
S2=Stage2

FIG. 13

| Chemical | Values of interest (mg/l) | LT | | RT | | A | | $LT_{50}$ | | %IpreSRL | %IFRL | | %IRT | | Number of increases | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | S1 | S2 | S1 | S2 | S1 | S2 | S1 | S2 | S2 | S1 | S2 | S1 | S2 | S1 | S2 |
| 3,5 DCP | 10 | 0 | 0 | 12.6 | 1 | 40±2 | 79±25 | ↑ | ↑ | 102±3 | 134±10 | 172±21 | 153±13 | 207±23 | 1 | 1 |
| PCP | 10 | 0 | 0 | 12.6 | 12.6 | 417±73 | 175±27 | ↑ | ↑ | 131±9 | 305±17 | 253±7 | 373±22 | 308±4 | 1 | 1 |
| $Zn^{2+}$ | 700 | 0 | 0 | 12.6 | 1 | 42±5 | 74±1 | ↑ | ↑ | 142±18 | 225±8 | 263±14 | 258±5 | 225±12 | 1 | 1 |
| $Cr^{6+}$ | 15 | 0 | 0 | 1 | 1 | 41±5 | 84±23 | - | - | 102±12 | 104±5 | 110±11 | 103±2 | 120±28 | 1 | 1 |
| Toluene | 25 (1) | 0 | 0 | n.a. | 1 | n.a. | 73±13 | n.a. | ↑ | 121±6 | n.a. | 113±3 | n.a. | 115±2 | 1 | 1 |
| SDS | 500 | 0 | 0 | 12.6 | 1 | 998±35 | 116±3 | ↑ | ↑ | 359±24 | 561±12 | 256±14 | 565±12 | 286±12 | 1 | 1 |

Note: LT=lag time
RT=rise time
A=changes in A (%)

%IpreSRL=% increase in pre-stimulation resting level
%IFRL=% increase in final resting level
%IRT=% increase in recovery time
S1=Stage 1
S2=Stage2

Fig. 14

| Chemical | Values of interest (mg/l) | LT | | RT | | A | | $LT_{50}$ | | %IpreSRL | %IFRL | | %IRT | | Number of increases | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | S1 | S2 | S1 | S2 | S1 | S2 | S1 | S2 | S2 | S1 | S2 | S1 | S2 | S1 | S2 |
| 3,5 DCP | 10 | 0 | 0 | 12.6 | 1 | 40±2 | 79±25 | ↑ | ↑ | 102±3 | 134±10 | 172±21 | 153±13 | 207±23 | 1 | 1 |
| $Cr^{6+}$ | 15 | 0 | 0 | 1 | 1 | 41±5 | 84±23 | - | - | 102±12 | 104±5 | 110±11 | 103±2 | 120±28 | 1 | 1 |
| $Zn^{2+}$ | 700 | 0 | 0 | 12.6 | 1 | 42±5 | 74±1 | ↑ | ↑ | 142±18 | 225±8 | 263±14 | 258±5 | 225±12 | 1 | 1 |
| SDS | 500 | 0 | 0 | 12.6 | 1 | 998±35 | 116±3 | ↑ | ↑ | 359±24 | 561±12 | 256±14 | 565±12 | 286±12 | 1 | 1 |
| 3,5-DCP + $Cr^{6+}$ | 6+12 | 0 | 0 | 12.6 | 1 | 33±4 | 88±13 | ↑ | - | 96±26 | 117±4 | 120±14 | 128±5 | 119±10 | 1 | 1 |
| $Cr^{6+}Zn^{2+}$ | 30+350 | *0* | 0 | *1* | 1 | *23±6* | 76±4 | ↑ | - | 100±5 | *143±18* | 150±12 | *158±26* | 154±6 | *1* | 2 |
| 3,5DCP +$Zn^{2+}$ | 10+350 | *0* | 0 | *12.6* | 1 | *65±5* | 86±2 | ↑ | - | 103±9 | *294±18* | 153±16 | *311±14* | 208±11 | *1* | 2 |
| 3,5-DCP+ $Cr^{6+}$ $Zn^{2+}$ | 6+12+350 | *0* | 0 | *12.6* | 1 | *25±2* | 79±5 | ↑ | - | 102±8 | *164±4* | 150±9 | *160±5* | 195±8 | *1* | 2 |
| Mixture 1 | See M&M | 0 | 0 | 12.6 | 12.6 | 466±13 | 128±6 | ↑ | ↑ | 262±13 | 402±17 | 501±38 | 446±17 | 477±28 | 2 | 2 |
| Mixture 2 | See M&M | 0 | 0 | 1 | 1 | 116±8 | 69±14 | ↑ | - | 148±16 | 177±44 | 132±27 | 170±28 | 120±7 | 1 | 1 |

Italics represents data obtained with very high concentrations of toxicants: $Zn^{2+}$=700 mg/l; $Cr^{6+}$=120 mg/l; 3,5 DCP=49 mg/l

FIG. 15

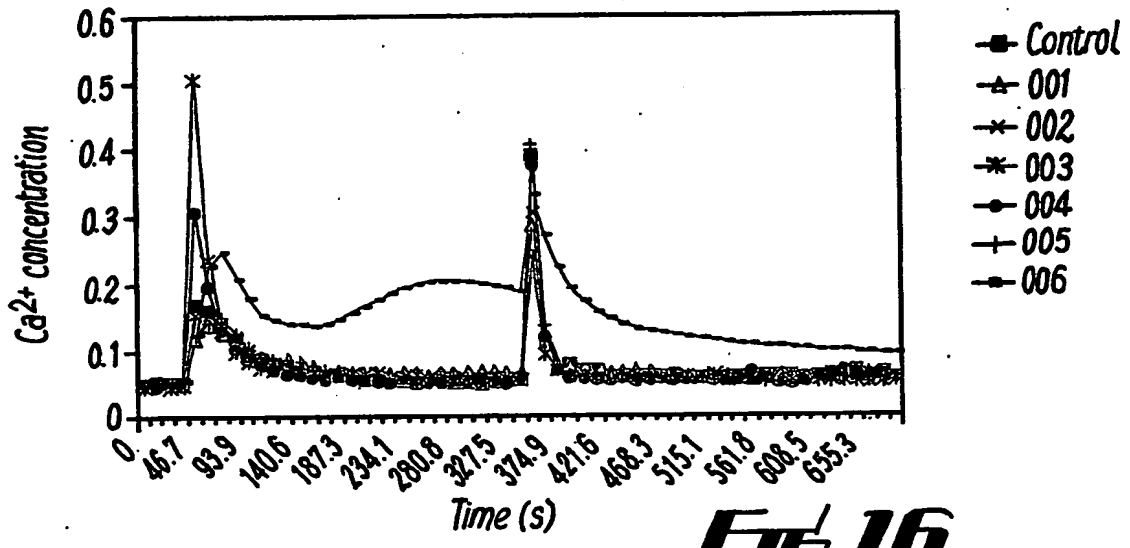


FIG. 16

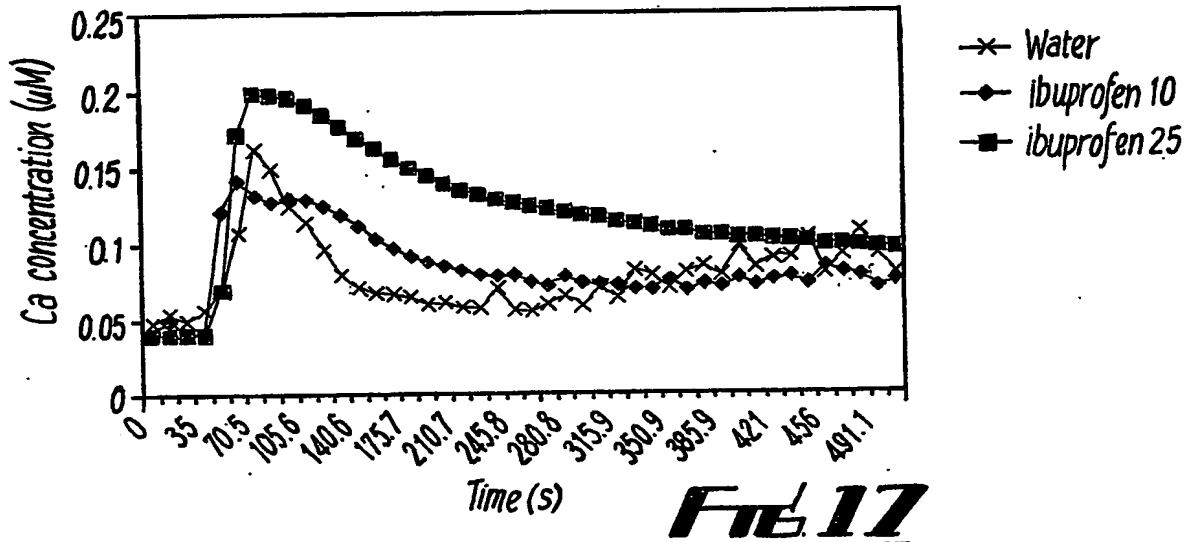


FIG. 17

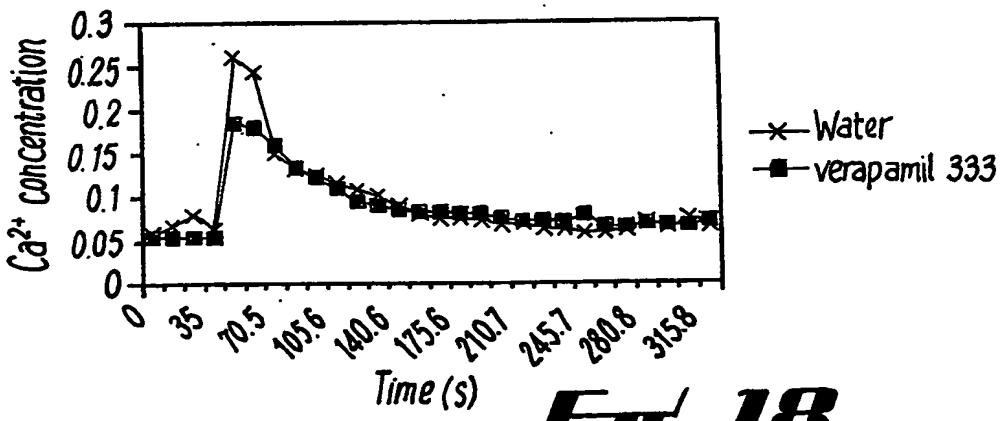


FIG. 18

| Chemical | Concentration (mg/l) | RT | A | $LT_{50}$ | %IFRL | %IRT |
|---|---|---|---|---|---|---|
| Ibuprofen | 10 | ↓ | - | ↓ | - | - |
| | 25 | - | ↑↑ | ↑ | - | ↑ |
| Verapamil | 333 | - | ↑ | - | - | - |

FIG. 19

| Chemical | Concentration (μM) | RT | A | $LT_{50}$ | %IPreRL | %IFRL | %IRT |
|---|---|---|---|---|---|---|---|
| CPA | 10 | - | - | - | - | - | - |
| | 20 | - | ↑ | ↑ | ↑ | ↑ | ↑ |
| | 50 | - | ↑↑ | ↑ | 3*↑ | 4*↑ | 4*↑ |
| KP4 | 5.4 | - | ↓ | ↑ | - | - | - |

FIG. 20

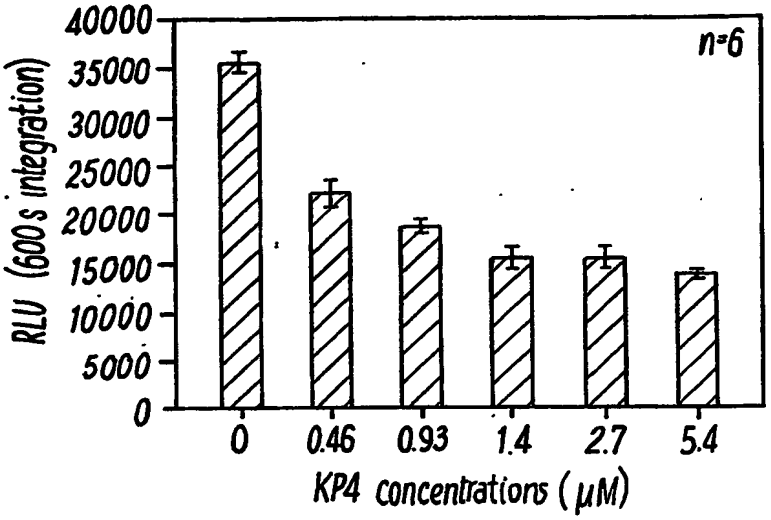


Fig. 21

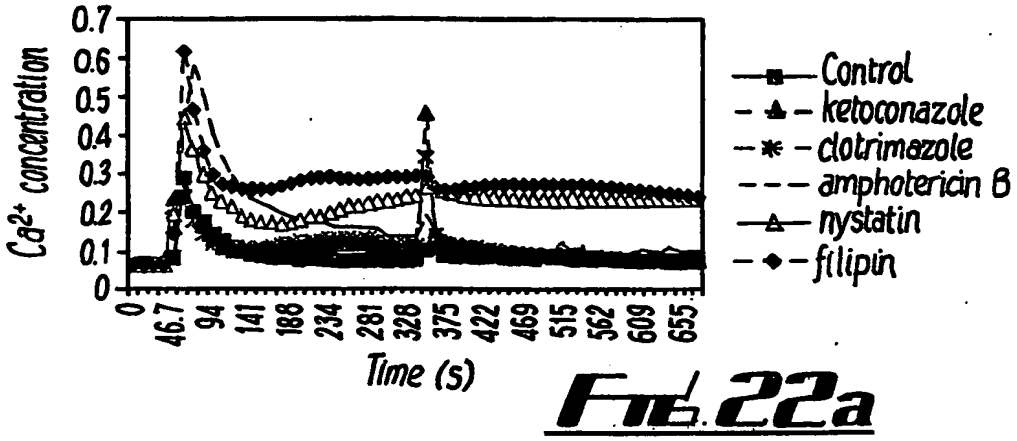


Fig. 22a

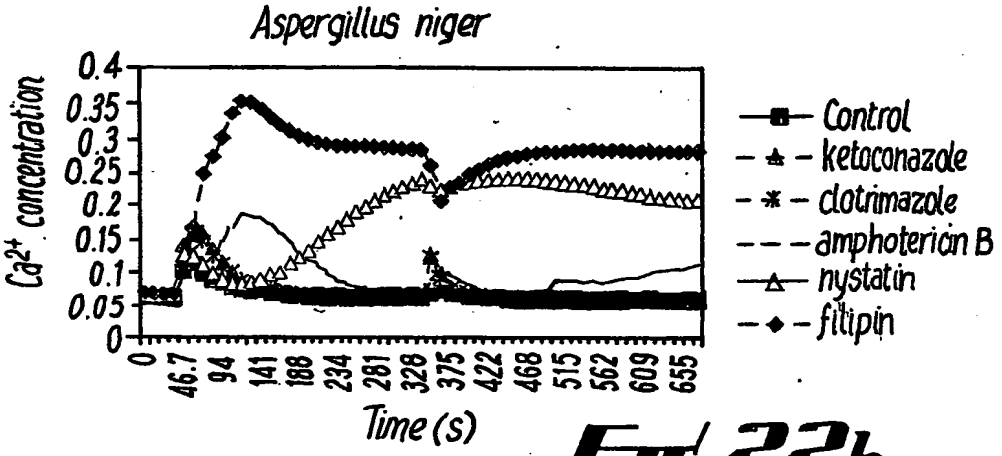


Fig. 22b

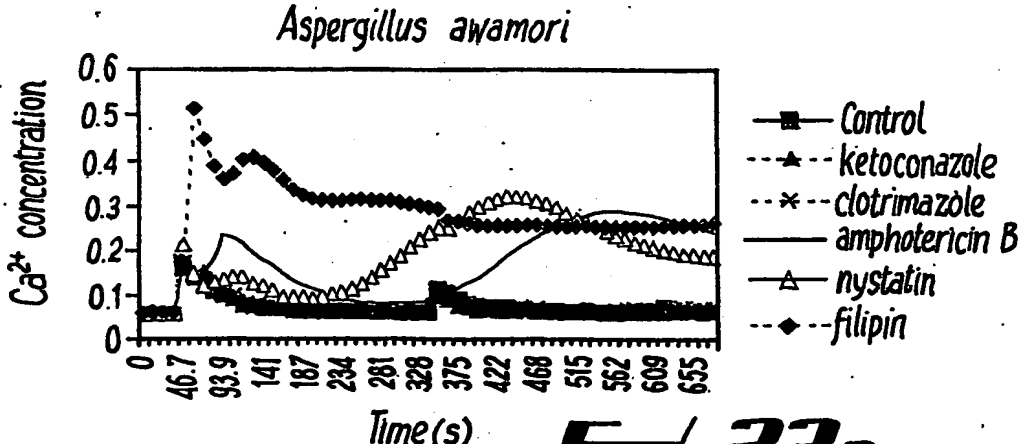


Fig. 22c

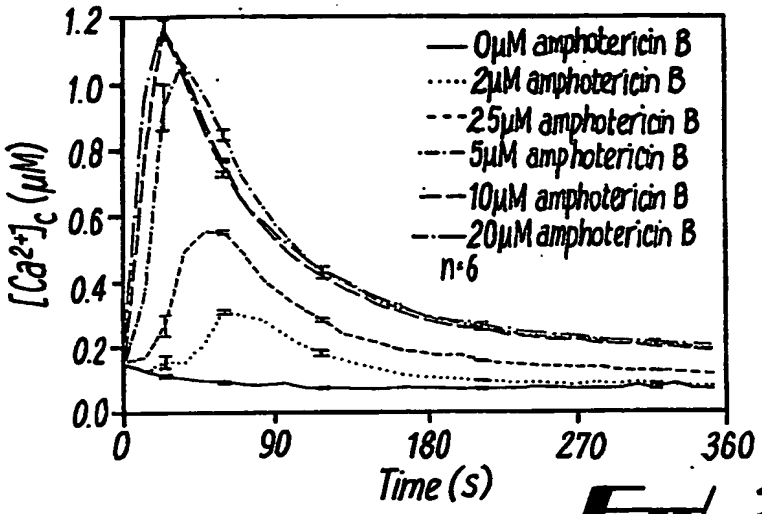


FIG. 23

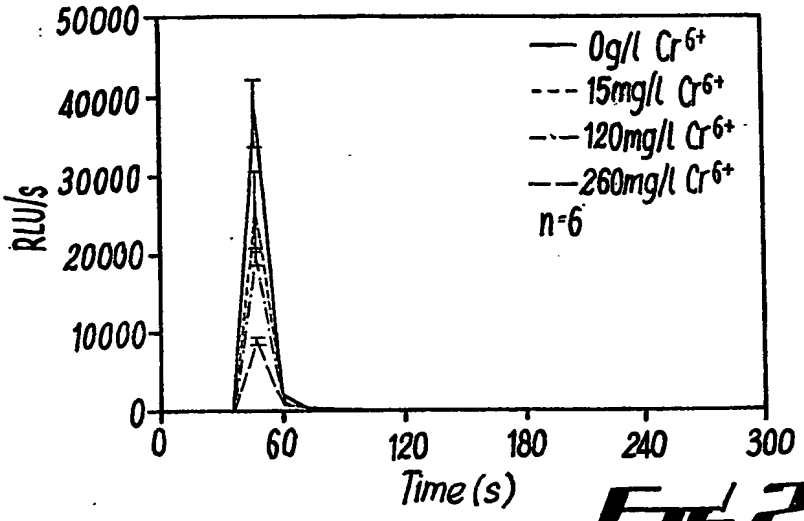


FIG. 24

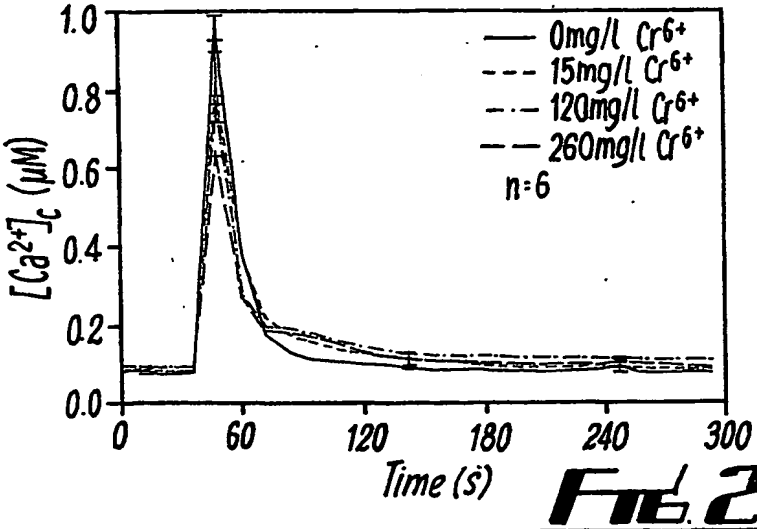


FIG. 25